

SEPTAGE DISPOSAL

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Contents

- ▶ Why It Is Important
- ▶ Septage Disposal
- ▶ Tid-Bits

Why It Is Important

»» Do it right!

Why It Is Important

► Contamination Risks

- The risk of impacting people and the environment is much greater now than it was 50 years ago—or even 10 years ago.
- Improperly disposal of wastewater can contaminate drinking water
- Serious ecological implications

Contamination Risks

- ▶ Increased Risks Are Due In Part To:
 - An increase in the presence and mutation of super germs and viruses
 - Growing use of pharmaceuticals by the general population. These pharmaceuticals are found in wastewater in broad and increasing quantities.
 - An increase in the population of North Dakota residents and visitors
 - An increase in the volume of wastewater for disposal
 - An increase impact on the environment
 - Increased dependency on land use
 - The increased likelihood of vectors spreading contamination.

Septage Disposal

» NDAC 33-21-02-08



NDAC 33-21-02-08(1)

▶ Septage Disposal

- Septage must be disposed of at a department-permitted wastewater treatment facility to be treated, with the exception of disposal to acceptable sites for land application if no other reasonable method of disposal is available. All septic system servicers shall submit disposal site information to the department with their permit applications as required under NDAC 33-21-02-05(2). Treatment facilities that do not have a NDPDES permit number can still be utilized but must be reported during the application/renewal process on SFN 60533.

NDAC 33-21-02-08(2)

► Land Application Site Approval

- Class I septic system servicers shall obtain the department's written pre-approval for land application sites. Approval requests may be submitted with a permit application or during the term of the permit. Approval requests not included in a permit application shall include the proposed land application site information listed in NDAC 33-21-02-06(3). If the approval request contains all the required information, the land application site may be given conditional approval within 30 days of submission. Full approval is contingent on a site assessment conducted by the department and will be granted automatically unless otherwise notified by the department. The department will not approve sites that may cause harm to the environment or threaten public health. Once given full approval by the department, land application sites shall retain approval for a period of not less than five years, unless additional future information indicates a change in the environmental status of the property. Examples for cause of approval termination include excessive runoff, odor complaints, illegal disposal, etc. Class II septic system servicers shall follow all general land application requirements as outlined in subsection 4-8.

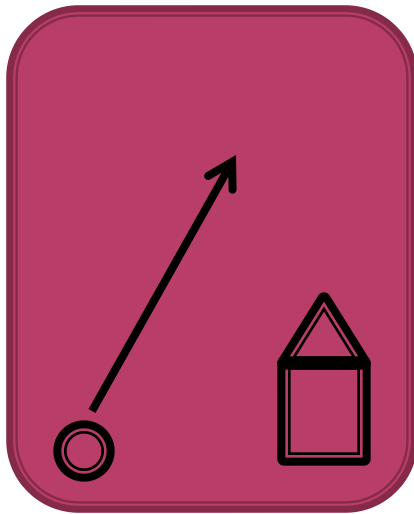
NDAC 33-21-02-08(3)

- ▶ Rural Single Family Exception
 - A septic system servicer land-applying septage from a rural, single-family residence on property owned or leased by the owner or lessee of the rural, single-family residence is exempt from obtaining the department's written approval for the land application site. General land application site requirements still apply and must be followed.

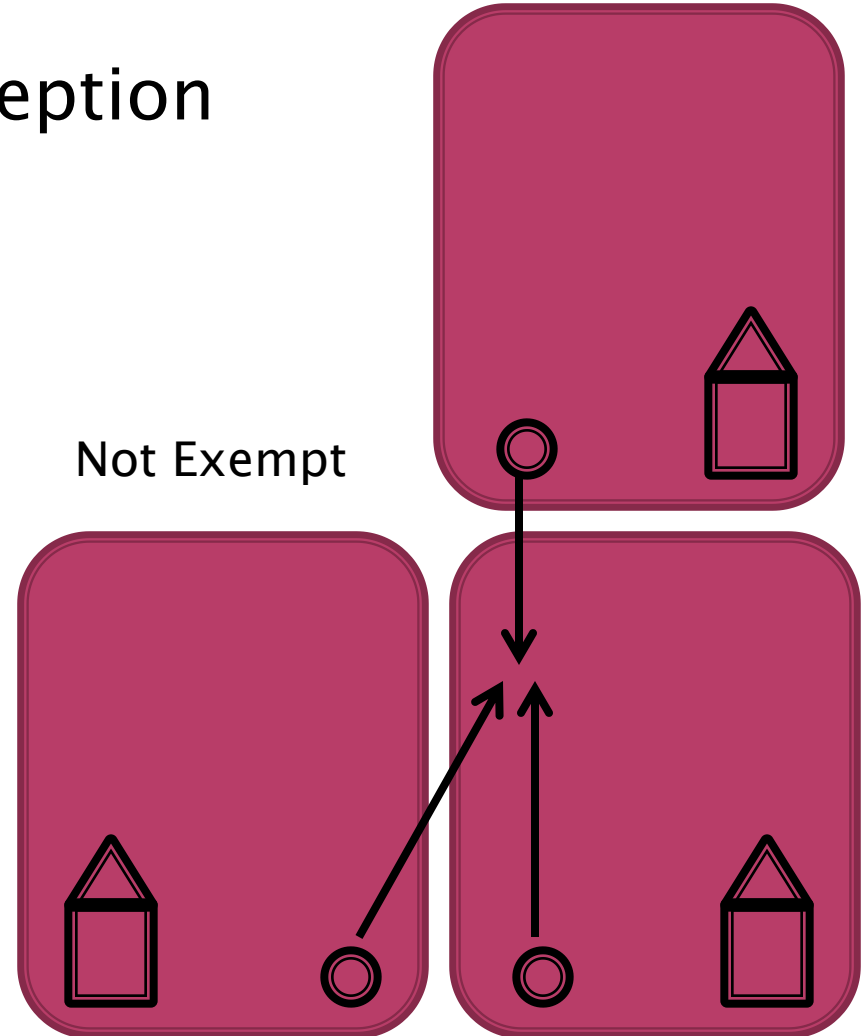
NDAC 33-21-02-08(3)

► Rural Single Family Exception

Exempt



Not Exempt



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - a) Application of septage is not allowed on a designated 100-year floodplain as defined by FEMA flood maps nor below the ordinary high water mark.
 - <https://msc.fema.gov/portal>

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - b) Application of septage is not allowed on areas of a site ponded with water or septage.

NDAC 33-21-02-08(4)



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - c) Septage cannot be applied when soils are saturated.

NDAC 33-21-02-08(4)



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - d) Septage cannot be applied by spraying from public roads or across road right of ways.

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - e) All septage that is land-applied must be uniformly distributed over the area by use of a distribution device (such as a splash plate or spreader)

NDAC 33-21-02-08(4)



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - f) Measures must be taken to ensure that the ponding of septage and runoff does not occur.

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - g) Slope restrictions are as follows:

% of Slope	0-6%	6-12%	>12%
Type of land application allowed	Surface application, injection, or immediate incorporation	Injection	Not allowed

NDAC 33-21-02-08(4)

► Slope

- What is slope?
 - Slope is defined as a grade, a slant, and inclination, pitch or tilt. For our purposes, the term slope refers to the degree of incline or steepness characteristic to a piece of land, and is usually stated in a percentage.
- How do you calculate slope?
 - Slope is calculated by “rise over run”.
 - The rise (height) of the land divided by the distance it runs, multiplied by 100.
 - Example: A 6% slope is a slope that rises or falls 6 feet for each 100 feet of length.
- Slope can be determined by using a topographic map or clinometer.
- [http://store.usgs.gov/b2c_usgs/usgs/maplocator/\(ctype=areaDetails&xcm=r3standardpitr ex_prd&carearea=%24ROOT&layout=6_1_61_48&uiarea=2\)/.do](http://store.usgs.gov/b2c_usgs/usgs/maplocator/(ctype=areaDetails&xcm=r3standardpitr ex_prd&carearea=%24ROOT&layout=6_1_61_48&uiarea=2)/.do)

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - h) Separation distances are as follows:

NDAC 33-21-02-08(4)

- Separation distances are as follows:

Feature	Surface Applied	Incorporated 48 hrs	Injected
Private Drinking Water Supply Wells	200 feet	200 feet	200 feet
Public Drinking Water Supply Wells	1 000 feet	1 000 feet	1 000 feet
Irrigation Wells	50 feet	50 feet	50 feet
Residences*	1 000 feet	1 000 feet	1 000 feet
Public Contact Sites	200 feet	200 feet	50 feet
Surface Water Features	200 feet	200 feet	200 feet
*Distances are shown unless permission is obtained by owner and resident to alter setback distance.			

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - i) Public contact sites shall be posted for 30 days after septage application.

NDAC 33-21-02-08(4)



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - j) Septage shall be applied at a rate of less than 20,000 gallons per acre per day and less than 100 lbs of nitrogen per acre per year. The department may waive these rates upon a site-by-site review basis.

NDAC 33-21-02-08(4)

► How to calculate Application Rates:

- 1: Annual Application Rate (AAR): the maximum volume of domestic septage that may be applied to any site during a 365-day period in gallons per acre per year
- 2: Applied Gallons per Acre
- 3: Pounds of Nitrogen per Acre

NDAC 33-21-02-08(4)

► How to calculate Application Rates:

- 1: $AAR = \frac{\text{Pounds of Nitrogen Required for Crop Growth}}{0.0026}$
- 0.0026=conversion factor
- Example: Maximum 100 lbs of Nitrogen per acre per year so $AAR = 100 / 0.0026 = \mathbf{38,500}$

NDAC 33-21-02-08(4)

► How to calculate Application Rates:

- 2: Applied Gallons per Acre=
$$\frac{\text{Total number of Gallons Applied}}{\text{Total Acres Used}}$$
- Example: If you apply 3,400 gallons of septage on a 20-acre field, the applied gallons per acre would be:

$$3400/20=170 \text{ gallons/acres}$$

NDAC 33-21-02-08(4)

► How to calculate Application Rates:

- 3: Pounds of Nitrogen per Acre=
$$\frac{\text{Total Number of Gallons Applied} * 0.0026}{\text{Total Acres Used}}$$
- Example: If you apply 3,400 gallons of septage on a 20-acre field, the pounds of nitrogen per acre would be:

$$(3400 * 0.0026) / 20 = \mathbf{0.442 \text{ lbs N/acre}}$$

NDAC 33-21-02-08(4)

► Risks of Overloading

- Wastewater has the potential to stimulate growth by nutrient enrichment through phosphorus and nitrogen loading.
 - Can cause hypoxia
 - Loss of dissolved oxygen in the water and can lead to serious ecological implications



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - k) Land application sites shall be maintained litter free.
 - Pre-screening septage prior to land application is one method in reducing the amount of litter.

NDAC 33-21-02-08(4)



NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Site requirements shall be followed by all septic pumper classifications, including rural, single family exemptions, and are as follows:
 - I) The discharge from the servicing units shall be controlled so that pooling or ponding of septage during land application does not occur.

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements
 - Septic system operators are responsible for following all local regulations.
 - Example: In the news recently
 - http://bismarcktribune.com/bakken/tribal-members-decry-sewage-dumping-disposal-company-calls-it-a/article_d91f9ac7-111b-5bb9-9e77-ec3d90252390.html
 - Example: Annexed land

NDAC 33-21-02-08(4)

- ▶ General Land Application Requirements

▶ EXERCISE

19th Ave SE



18th Ave S
NORTH DAKOTA
DEPARTMENT OF HEALTH



42nd Ave SE

Ave 33E



NORTH DAKOTA
DEPARTMENT OF HEALTH

th St NE

13

200

11

152nd Ave NE

153rd Ave NE



NORTH DAKOTA
DEPARTMENT OF HEALTH

NDAC 33-21-02-08(7)

- ▶ Land Application Requirements
 - Snow-covered ground application is acceptable if there are less than 8 inches of snow and less than a 6% slope onsite
 - All other general land application requirements need to be met



04/02/2013



NORTH DAKOTA
DEPARTMENT OF HEALTH

NDAC 33-21-02-08(8)

► Land Application Requirements

- Storage of septage greater than 25,000 gallons requires department approval.
- All storage sites shall be designed and maintained to prevent a public nuisance and shall be in compliance with NDCC61-28.



NORTH DAKOTA
DEPARTMENT of HEALTH



05/19/2014



NORTH DAKOTA
DEPARTMENT OF HEALTH

NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

- What are pathogens?
 - Organism capable of causing disease.
 - Examples: bacteria, viruses, protozoa, and helminths.
 - Can be spread through contact with bodily fluids, septage, or contact with contaminated water.

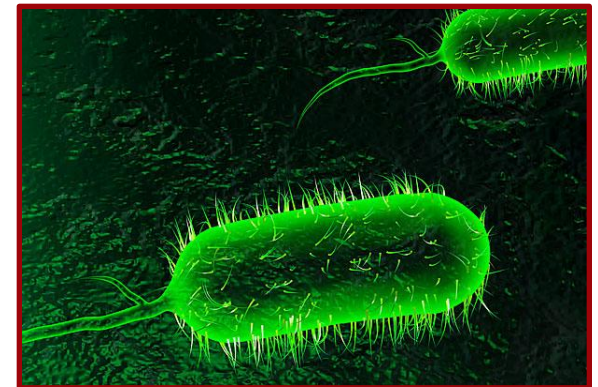
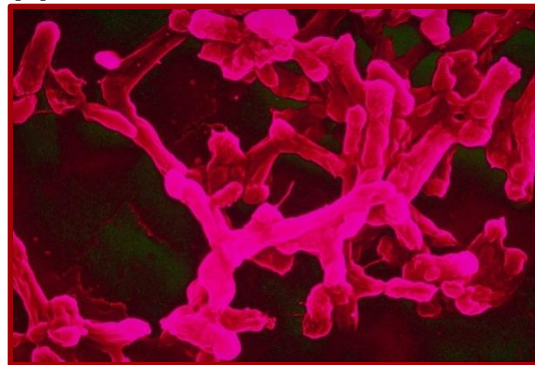
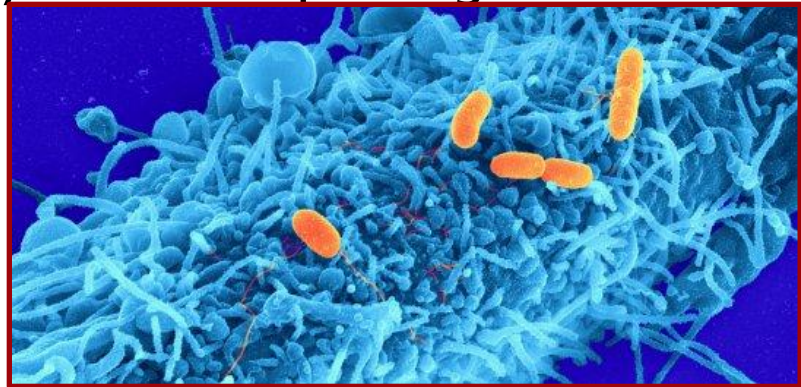


NDAC 33-21-02-08(5)

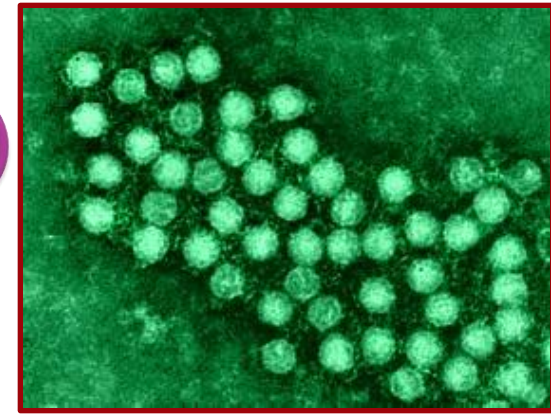
► Pathogen Reduction Measures

◦ Bacteria

- Diseases are caused by bacterial pathogens located in wastewater.
 - Dysentery
 - Cholera
 - Typhoid Fever
 - Paratyphoid
 - Salmonella Type Diseases



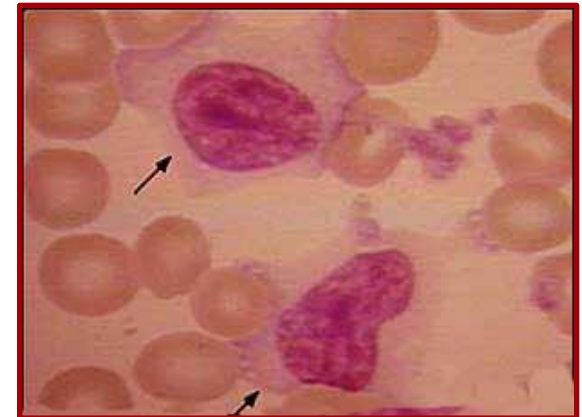
NDAC 33-21-02-08(5)



▶ Pathogen Reduction Measures

◦ Viruses

- Numerous viruses may infect humans through contact with wastewater. Main viruses include:
 - Adenovirus
 - Infections can cause of common cold, pharyngitis, bronchitis, pneumonia, diarrhea, pink eye (conjunctivitis), fever, bladder infection, neurologic disease
 - Enterovirus (including polioviruses)
 - Infections can cause viral conjunctivitis, hand-foot-and-mouth disease, and viral meningitis
 - Hepatitis A Virus
 - Diarrhoea-Causing Viruses (especially rotavirus)



NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Protozoa

- Commonly cause diarrhea
- Examples include:
 - Giardia Lamblia
 - Causes Giardiasis; most common pathogenic parasitic infection in humans worldwide.
 - Balantidium Coli
 - Causes Balantidiasis
 - Entamoeba Histolytica
 - Causes Amebiasis



NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Helminths

- Parasitic worms–2 Groups
 - Flatworms
 - Roundworms
- Can cause serious illnesses



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

- All classes of pumpers shall use one of the following pathogen reduction measures:

NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

- Alternative 1: Septic system servicers shall pump domestic septage from a septic tank or holding tank and land apply it without treatment.

- Applicable Restrictions:
 - Crop
 - Grazing
 - Site

NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Crop Restrictions:

- (a) Food crops with harvested parts that touch the septage and soil mixture and are totally aboveground shall not be harvested for **14 months** after application of domestic septage.
- Example: Pumpkins



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Crop Restrictions:

- (b) Food crops with harvested parts below the surface of the land shall not be harvested for **38 months** after application of domestic septage.
- Example: Sugar Beets



NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Crop Restrictions:

- (c) Animal feed, fiber, and those food crops that do not touch the soil surface shall not be harvested for **30 days** after the application of domestic septage.
- Example: Wheat



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Crop Restrictions:

- (d) Turf grown on land where domestic septage is applied shall not be harvested for **1 year** after application of the domestic septage when the harvested turf is placed either on a lawn or land with a high potential for public exposure.
- Example: Sod

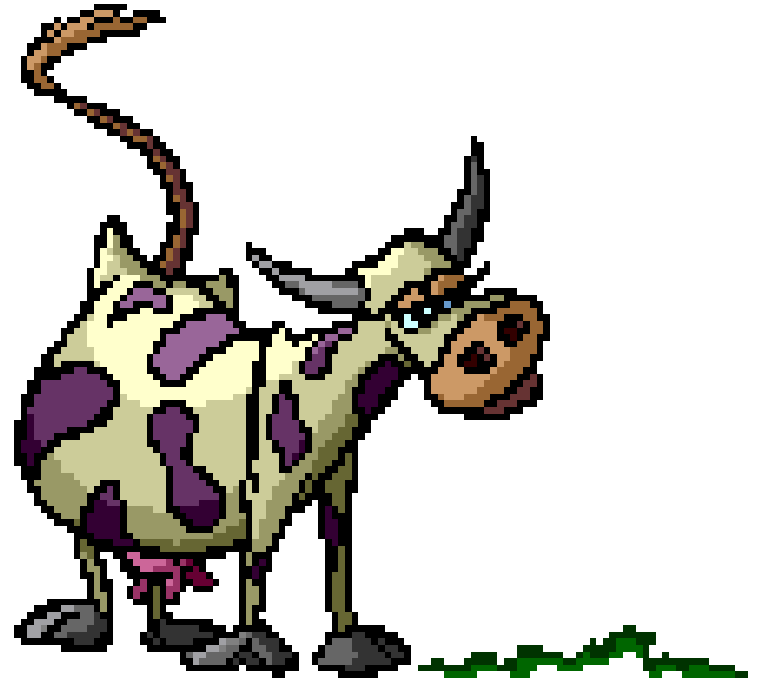


NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Grazing Restrictions:

- Animals shall not be allowed to graze on the land for **30 days** after the application of domestic septage.



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Site Restrictions:

- Public access to land with a low potential for public exposure shall be restricted for **30 days** after the application of domestic septage.
 - Examples:
 - Remoteness of site
 - Posting with no trespassing signs
 - Simple fencing

NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

- Alternative 2: Septic system servicers shall pump domestic septage from a septic tank or holding tank that has had its pH raised to a 12 or higher by the addition of alkaline material and, without the addition of more alkaline material, the septage must remain at a pH level of twelve or higher for at least 30 minutes prior to being land applied.
- Applicable Restrictions:
 - Crop

NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Crop Restrictions:

- (a) Food crops with harvested parts that touch the septage and soil mixture and are totally aboveground shall not be harvested for **14 months** after application of domestic septage.
- Example: Pumpkins



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Crop Restrictions:

- (b) Food crops with harvested parts below the surface of the land shall not be harvested for **20 months** after application of domestic septage when the domestic septage remains on the land surface for **4 months** or longer prior to incorporation into the soil.
- Example: Potatoes
- Sugar beets



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Crop Restrictions:

- (c) Food crops with harvested parts below the surface of the land shall not be harvested for **38 months** after application of domestic septage when the domestic septage remains on then land surface for less than **4 months** prior to incorporation into the soil.
- Example: Sugar Beets



NDAC 33-21-02-08(5)

► Pathogen Reduction Measures

◦ Crop Restrictions:

- (d) Animal feed, fiber, and those food crops that do not touch the soil surface shall not be harvested for **30 days** after the application of domestic septage.
- Example: Corn



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

◦ Crop Restrictions:

- (e) Turf grown on land where domestic septage is applied shall not be harvested for **1 year** after application of the domestic septage when the harvested turf is placed either on a lawn or land with a high potential for public exposure.
- Example: Sod



NDAC 33-21-02-08(5)

▶ Pathogen Reduction Measures

- Other equivalent alternatives may be acceptable with prior department approval.

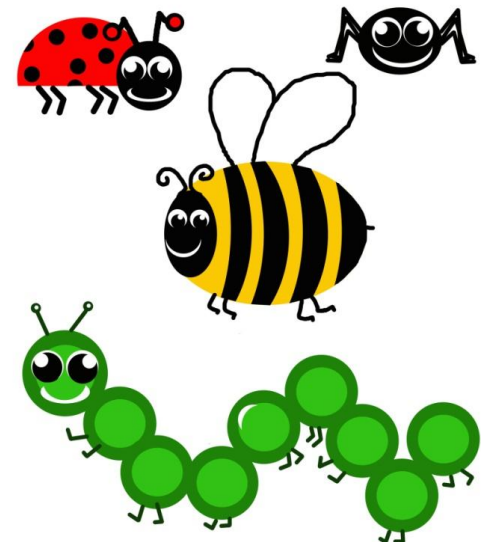
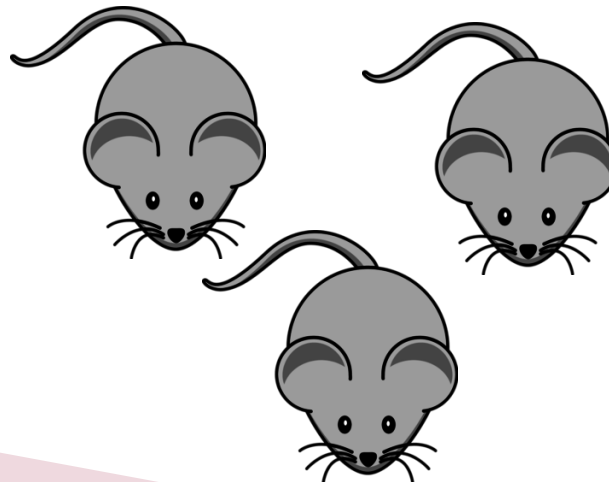
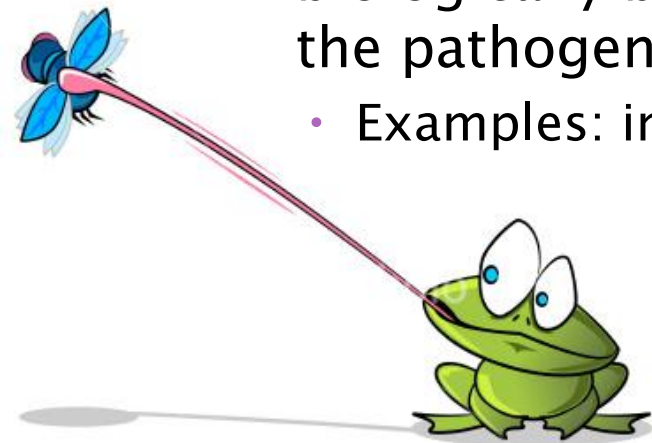
NDAC 33-21-02-08(5)

► Vector Attraction Reduction Measures

◦ What are vectors?

- Any living organism capable of transmitting a pathogen from one organism to another either mechanically (by simply transporting the pathogen) or biologically by playing a specific role in the life cycle of the pathogen.

- Examples: insects, rodents, and birds.



NDAC 33-21-02-08(5)

- ▶ Vector Attraction Reduction Measures
 - Why reduce vectors attraction to septage?
 - To decrease the characteristics of septage that attract vectors that are capable of carrying infective agents.
 - Prevent the septage from coming into contact with vectors or people who will become a host to the pathogens that may reside in the septage.

NDAC 33-21-02-08(6)

- ▶ Vector Attraction Reduction Measures
 - All classes of pumpers shall use one of the following vector attraction reduction measures:

NDAC 33-21-02-08(6)

- ▶ Vector Attraction Reduction Measures
 - Alternative 1: Septic system servicers shall inject domestic septage below the surface of the land, and no significant amount of septage shall be present on the land surface within 1 hour after the septage is injected.



NDAC 33-21-02-08(6)

- ▶ Vector Attraction Reduction Measures
 - Alternative 2: Septic system servicers shall incorporate domestic septage applied to the land surface into the soil surface plow layer within 48 hours after application.









NDAC 33-21-02-08(6)

- ▶ Vector Attraction Reduction Measures
 - Alternative 3: Septic system servicers shall raise the pH of domestic septage to 12 or higher by addition of alkaline material and, without addition of more alkaline material, the septage must remain at a pH level of 12 or higher for 30 minutes prior to being land-applied.

NDAC 33-21-02-08(6)

- ▶ Vector Attraction Reduction Measures
 - Other equivalent alternatives may be acceptable with prior department approval.

CROP	TIME FRAME
	14 Months
	20 Months (if septage was on land for 4 months before incorporation)
	38 Months (if septage was on land for less than 4 months before incorporation)
	30 Days
	 1 Year (with high possibility of public exposure)

COMPOSTING

- ▶ Composting for Biosolids Management
 - Composting is one of several methods for treating biosolids
 - Three main methods of composting biosolids
 - Each method involves mixing dewatered wastewater solids with a bulking agent to provide carbon and increased porosity. Mixture is placed into pile or vessel where microbial activity causes the temperature to rise
 - Called “Active Composting”

COMPOSTING

▶ Aerated Static Pile

- Dewatered cake is mechanically mixed with a bulking agent and stacked into long piles over a bed of pipes through which air is transferred to the composting pile.
- After active composting, the material is moved into a curing pile.

COMPOSTING

► Windrow

- Dewatered solids are mixed with a bulking agent and piled into long rows. Because there is not piping to supply air to the piles, they are mechanically turned over to increase the amount of oxygen.
- Material is moved into curing piles after active composting.

COMPOSTING

► In-Vessel

- A mixture of dewatered solids and bulking agent is fed into a silo, tunnel, channel, or vessel. Augers, conveyors, rams, or other devices are used to aerate, mix, and move the product through the vessel to the discharge point. Air is generally blown into the mixture.
- After active composting, material is moved into curing pile.

COMPOSTING

► Bulking Agents

- Agricultural by-products
- Yard trimmings
- Food by-products
- Industrial by-products from wood processing

TID-BITS

»» Random yet related
information

TID-BITS

► Know The Weather Conditions

- Weather conditions can dramatically affect the ability of the disposal area to properly receive wastewater:
 - Weather can prevent the ground from absorbing wastewater properly
 - Weather can increase the chance of illegal runoff of wastewater
 - Weather can prevent proper post disposal requirements, such as incorporation

TID-BITS

- ▶ Know The Recent Disposal History
 - Each disposal site has a limitation of wastewater that it can receive per application, per hour, per day, per week, per year. You must know the disposal history in order to ensure you do not violate your permits by disposing of more wastewater than the site can handle.

TID-BITS

► Have a Backup Plan

- Every step of the disposal process, you need to make sure you have a backup plan should something go wrong. Whether it is a breakdown, an accident, a spill—whatever it is you are doing you need to have a contingency plan in case something goes wrong or does not happen the way it was planned.

TID-BITS

► Soil

- The type of soil is important to consider when applying septage. Soil types are usually distinguished by their texture. Most common types are:
 - Sand
 - Loam
 - Silt
 - Clay

TID-BITS

► Soil Pros and Cons

- Sandy soils are the finest soil type, with loose particles. Clay soil is the most compact and heavy. While sandy soils have the greatest ability to absorb septage, they also have the least amount of organic matter which is host to beneficial bacteria which help to break down the septage and render it safe. On the other hand, clay has the least absorbent qualities of the soil types. This means soils that are high in clay tend to limit septage absorbance and create more undesirable runoff of septage.

TID-BITS

► Soil Absorption

- When determining septage absorption, there are a few factors to consider:
 - 1. Soil permeability
 - How easily is the soil penetrated by septage.
 - 2. Soil Retention
 - How well or long the soil holds septage.

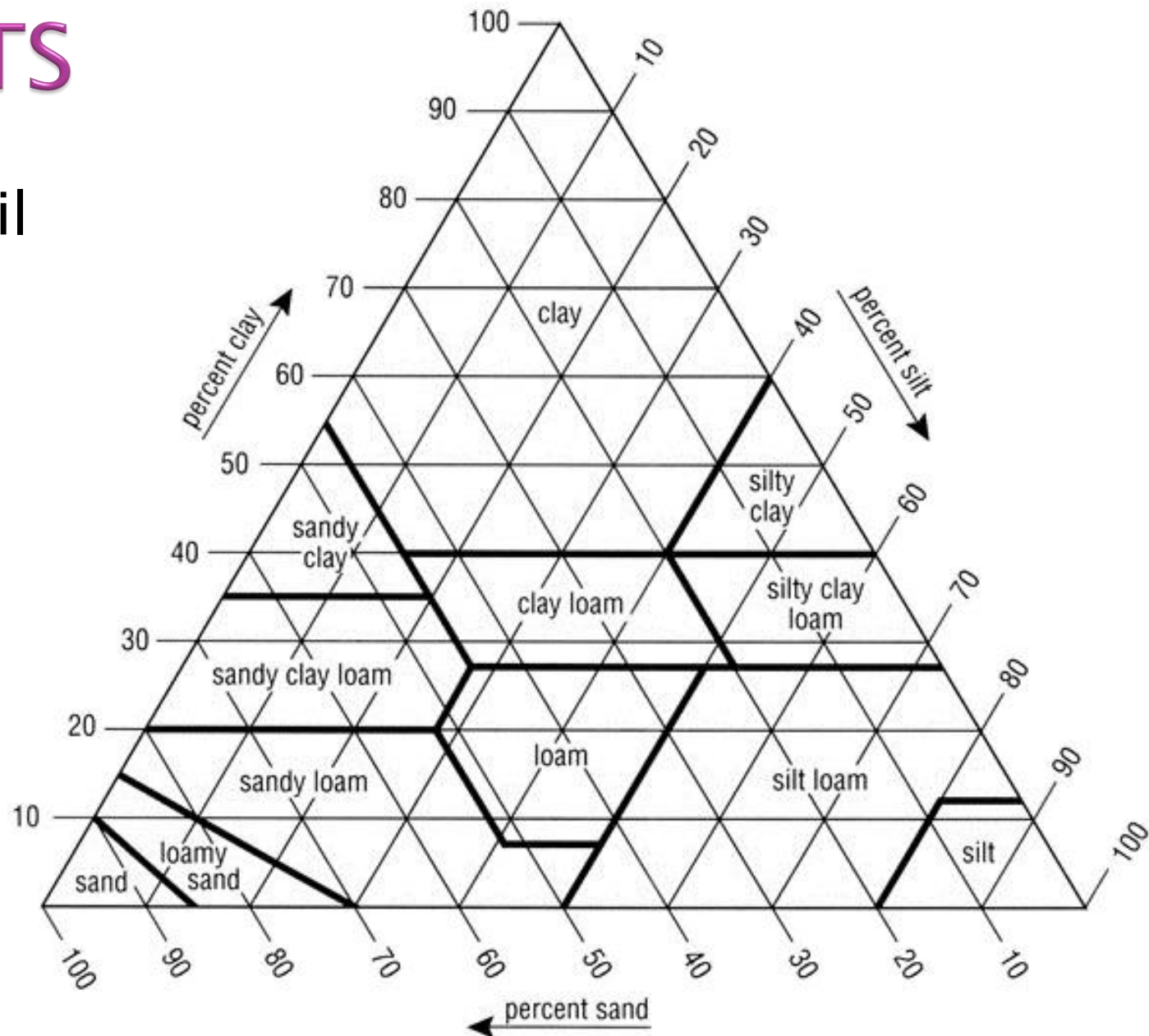
TID-BITS

► Soil Retention

- Sandy soils have very loose particles, they tend to have a high septage permeability, but they do not filter the septage as well as other denser and more organically charged soils. Clay soils have a low permeability and high water retention. This tends to make septage pool on the surface or otherwise limit the speed with which the septage can be absorbed by the soil. Loam soils have medium permeability and absorption and are ideal for septage absorption and incorporation. Silt soils have low permeability and high retention which tend to increase surface tension and limit the absorption of the septage and it's incorporation into the soil's subsurface.

TID-BITS

▶ USDA Soil Texture Triangle



TID-BITS

- ▶ NRCS Web Soil Survey
 - <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- ▶ How to tell the slope, texture, soil type, etc.

Report Illegal Activity

- ▶ Anyone having knowledge of illegal dumping or unlicensed servicers should report that activity to the department at:
 - www.ndhealth.gov
 - 701.328.5210



QUESTIONS???

»» Thank you!